

IN THE CLAIMS

What is claimed is:

- 1 **1.** A semiconductor device, comprising:
 - 2 a metal base having a bottom portion formed from a metal plate and at
 - 3 least one connection electrode that extends upward from at least a part of the
 - 4 bottom portion to a first surface level, the at least one connection electrode for
 - 5 mounting the semiconductor device to a mounting surface; and
 - 6 a semiconductor chip mounted to the bottom portion of the metal base
 - 7 having surface electrodes at a second surface level, the first surface level
 - 8 being higher than the second surface level by a predetermined amount, and the
 - 9 surface electrodes for mounting the semiconductor device to the mounting
 - 10 surface.

- 1 **2.** The semiconductor device of claim 1, wherein:
 - 2 the predetermined amount is greater than 0 millimeters and less than or
 - 3 equal to 0.1 mm.

- 1 **3.** The semiconductor device of claim 1, further including:
 - 2 solder balls or bumps formed on the at least one of the electrodes
 - 3 selected from the group consisting of the at least one connection electrode and
 - 4 the surface electrodes.

1 **4.** The semiconductor device of claim 1, wherein:
2 the semiconductor chip is an insulated gate field effect transistor
3 (IGFET) having a drain electrode formed on a rear surface in direct electrical
4 contact with the bottom portion of the metal base so that the at least one
5 connection electrode is a drain connection electrode, and the surface
6 electrodes include a gate electrode and source electrode for the IGFET.

1 **5.** A semiconductor device, comprising:
2 a metal base having a bottom portion formed from a metal plate and at
3 least two side portions situated upward from the bottom portion, the at least
4 two side portions having notches therein to form upper and lower edges in the
5 side portions, the upper edges being connection electrodes for mounting the
6 semiconductor device to a mounting surface; and
7 a semiconductor chip mounted to the bottom portion of the metal base
8 having a surface with surface electrodes for mounting the semiconductor
9 device to the mounting surface.

1 **6.** The semiconductor device of claim 5, wherein:
2 each of the connection electrodes has an area that is less than any of
3 the surface electrodes.

1 **7.** The semiconductor device of claim 5, wherein:
2 the connection electrodes are symmetrical about a first axis that is

3 parallel to the side portions, and symmetrical about a second axis that is
4 perpendicular to the first axis.

1 8. The semiconductor device of claim 5, wherein:

2 the metal base includes grooves along a border between the bottom
3 portion and each side portion.

1 9. The semiconductor device of claim 5, wherein:

2 the upper edges are bent outward away from remaining portions of the
3 side portion.

1 10. The semiconductor device of claim 5, wherein:

2 the surface electrodes of the semiconductor chip are at a first surface
3 level; and

4 the connection electrodes are at a second surface level higher than the
5 first surface level by a predetermined distance that is greater than 0 mm and
6 less than or equal to 0.1 mm.

1 11. The semiconductor device of claim 5, wherein:

2 the solder balls or bumps formed on the at least one of the connection
3 electrodes and one of the surface electrodes.

1 12. The semiconductor device of claim 5, wherein:

2 the semiconductor chip is an insulated gate field effect transistor
3 (IGFET) having a drain electrode formed on a rear surface in direct electrical
4 contact with the bottom portion of the metal base so that the at least one
5 connection electrode is a drain connection electrode, and the surface
6 electrodes include a gate electrode and source electrode for the IGFET.

1 **13.** A semiconductor device, comprising:

2 a metal base having a bottom portion formed from a metal plate and at
3 least one connection electrode for mounting the semiconductor device to a
4 mounting surface, the at least one connection electrode extending upward
5 from the bottom portion and being formed from portions of the metal plate
6 that are thicker than remaining portions; and

7 a semiconductor chip mounted to the bottom portion of the metal base
8 having a surface with surface electrodes for mounting the semiconductor
9 device to the mounting surface; wherein

10 the area of each of the at least one connection electrodes is less than
11 the area of any of the surface electrodes.

1 **14.** The semiconductor device of claim 13, wherein:

2 the at least one connection electrode is trapezoidal in cross section,
3 with an upper part having a smaller area than a lower part, the upper part
4 being further from the metal base than the lower part.

1 **15.** The semiconductor device of claim 13, wherein:
2 the at least one connection electrode includes a plurality of connection
3 electrodes that are symmetrical about a first axis that is parallel to the side
4 portions, and symmetrical about a second axis that is perpendicular to the first
5 axis.

1 **16.** The semiconductor device of claim 13, wherein:
2 the at least one connection electrode includes at least two connection
3 electrodes formed at opposing sides of the metal base with the semiconductor
4 chip sandwiched between the at least two connection electrodes.

1 **17.** The semiconductor device of claim 13, wherein:
2 the surface electrodes of the semiconductor chip are at a first surface
3 level; and
4 the connection electrodes are at a second surface level higher than the
5 first surface level by a predetermined distance.

1 **18.** The semiconductor device of claim 17, wherein:
2 the predetermined distance is greater than 0 mm and less than or equal
3 to 0.1 mm.

1 **19.** The semiconductor device of claim 13, wherein:
2 the semiconductor chip is mounted in a region close to one side of the

3 metal plate and all of the connection electrodes are formed in a region close to
4 an opposite side of the metal plate.

1 **20.** The semiconductor device of claim 13, wherein:

2 the at least one connection electrode includes at least two connection
3 electrodes formed in an inner region of the bottom portion, and positions of
4 the at least two connection electrodes and positions of the surface electrodes
5 are symmetrical about two axes that are essentially perpendicular to one
6 another.

1 **21.** The semiconductor device of claim 13, wherein:

2 the solder balls or bumps formed on the at least one of the connection
3 electrodes and one of the surface electrodes.

1 **22.** The semiconductor device of claim 13, wherein:

2 the semiconductor chip is an insulated gate field effect transistor
3 (IGFET) having a drain electrode formed on a rear surface in direct electrical
4 contact with the bottom portion of the metal base so that the at least one
5 connection electrode is a drain connection electrode, and the surface
6 electrodes include a gate electrode and source electrode for the IGFET.